WHAT IS CLAIMED IS:

1. A manufacturing method for a semiconductor device characterized by comprising:

a step of forming an element isolation region and a gate insulating film on a semiconductor substrate;

a step of forming a polycrystalline silicon film, for subsequently forming a gate electrode on the element isolation region and the gate insulating film;

a step of forming an insulating film on the polycrystalline silicon film;

a step of patterning the insulating film so as to open a region other than a region subsequently serving as a PMOS;

a step of changing the region of the polycrystalline silicon film corresponding to an insulating film opening into an N-type region by heat treatment in a diffusion furnace in an N-type impurity atmosphere;

a step of removing the insulating film patterned; and

a step of doping a P-type impurity into an entire surface of the polycrystalline silicon film through an ion implantation.

2. A manufacturing method for a semiconductor device according to Claim 1, further comprising forming a high melting point metal silicide including a tungsten silicide, a molybdenum silicide, or a titanium silicide, on the polycrystalline silicon.

3. A manufacturing method for a semiconductor device

according to Claim 1, wherein the polycrystalline silicon film has a thickness of 50 nm to 400 nm.

4. A manufacturing method for a semiconductor device according to Claim 1, wherein the insulating film has a thickness of 100 nm or more.

5. A manufacturing method for a semiconductor device according to Claim 1, wherein the N-type polycrystalline silicon has an impurity concentration of $1 \times 10^{20}/cm^3$ or more.

6. A manufacturing method for a semiconductor device according to Claim 1, wherein a dosage of a P-type impurity ion in the ion implantation is $1 \times 10^{15}/cm^2$ or more.